Preliminary BoNuS Runplan 6/3-11

Goals

1. Establish operations in the Hall: Can we control RTPC drift gas? HV? Read back operating parameters? Target fill/purge/change operations. Control/read back pressure and temperature. Does He buffer volume work as planned (can we establish purity)? Magnet operation? Safe operating envelope – trip off threshold?
2. Establish beam operations – how do we steer it through the target and how much background do we get from the walls/windows (Begin with "empty target"). How do we measure beam intensity (Faraday cup? BPMs?) *vs.* how much current can/want we run with (FC temperature). Automatic feedback loops? BOM signal and background (light tightness)?
3. Correlation between target density, beam intensity, Solenoid field, target position relative to Møller catcher and
   a. DC occupancy
   b. DC current draw
   c. Trigger rate/DAQ rate, event size and deadtime
   d. Rates in ToF, EC etc.
   e. Number of reconstructed electrons per second
   f. Current draw in RTPC
   g. Number of hits/occupancy in RTPC
   h. Number of tracks in RTPC
   i. Number of true coincidences
4. Define optimum operation parameters (drift velocity vs. latency vs. timing resolution, momentum resolution vs. dE resolution, signal size vs. noise – need to be able to measure!) as a function of
   a. Gas composition and flow
   b. HV distribution
   c. B-field
5. Test DAQ: Can we see coincidences? Do we get real tracks (online display – both off-time and on-time)? Does the DAQ record all relevant information? Can we reconstruct tracks? Determine their momenta and PID? Get dE distribution vs. track curvature? Correlate vertex with electron tracks? Vertex resolution? Relative timing RTPC/CLAS.
6. Calibration: Can we use max. dE vs. theta as long-term gain stability check? Can we correlate dE and momentum over a large sample of tracks (maybe separate for different parts of the RTPC)? Can we find coincident tracks and pinpoint their vertex? Can we use timing and vertex information to separate accidentals from real coincidences?
7. Run on D_2 for at least 1 shift to get first sample of what our data will look like. Ultimate goal: Do kinematic correction, see peaks etc. of n inclusive spectra.
8. Background rate (Møller, single hits, noise, other…)? Track rate? Good coincident track rate? Maximum tolerable beam current? Dependence on target density?

Pre-run work

1. Complete setup in EEL, test operations: Assemble detector, target, support beam with cables, pipes, HV and LV cables and BOM, cart, electronic racks.
2. Connect gas system, power to crates
3. Fiducialize (survey)
4. Cosmic test run in EEL and/or inside solenoid (dE calibration point-to-point)
5. Pedestal runs (with full readout) for each channel (again: EEL AND Hall!)

Conversion to Bonus/SVT tests (5/31- 6/3) – D.K. as amended by SK

1. (Can be done over Memorial Day)Warm target, ramp down solenoid, put into "safe mode"; warm up calorimeter. Bring already gas panel and unattached crates into hall.
2. Remove upstream beam line, remove cryotarget from beamline (6 hours?)
3. Warm up calorimeter, move back solenoid cart.
4. Uncable and remove calorimeter and arms from Solenoid (measure the rise of the solenoid and compensate?) (8 hours?)
5. Install SVT on solenoid
6. Survey as found location of SVT
7. Connect SVT electronics
8. Check out SVT
9. Move solenoid back in place.
10. Install bonus detector and target. (8 hrs?)
11. Align BD/BT – survey. (8-16 hrs?)
12. Install bonus target gas system
13. Install bonus detector gas system
14. Connect bonus electronics (AC to FEC crates, FEC to VME crate, USB cables, trigger coax cables (8 hrs)
15. Grounding (very important), noise hunt/elimination. Test runs (pedestal, cosmics)
16. Additional surveys (4 hrs)?
17. Install BPM and upstream beam pipes (should not need survey – 4 hrs)

Updated version as of 5/26 by Dave Kashy:

1	Warm Cryo Target	1 day	5/27/05 8:00	5/27/05 17:00	Tom,Dave[50%]
2	Bleed up and clear BPM/upstream beam line	4 hrs	5/27/05 8:00	5/27/05 12:00	Tom,Jill,Denny
3	Disconnect and remove Cryo Target	2 hrs	5/31/05 8:00	5/31/05 10:00	Steve,Tom,Denny,Jill
4	Pull back DVCS solenoid and measure height	1 hr	5/31/05 10:00	5/31/05 11:00	Doug,Dave,Calvin
5	Remove DVCS calorimeter and arms	2 hrs	5/31/05 11:00	5/31/05 14:00	Doug,Dave,Calvin
6	Push Solenoid in CLAS	0.5 hrs	5/31/05 14:00	5/31/05 14:30	Doug,Dave,Calvin
7	Pull Solenoid out of CLAS	0.5 hrs	5/31/05 16:30	5/31/05 17:00	Doug,Dave,Calvin
8	Have RADCON survey calorimeter	0.5 hrs	5/31/05 14:00	5/31/05 14:30	Radcon
9	Install SVT on solenoid	3 hrs	6/1/05 8:00	6/1/05 11:00	Dave,Tanest et al
10	Compensate for height change in solenoid ? Maybe on Friday!	1 hr	6/1/05 11:00	6/1/05 12:00	Dave,Survey?
11	Connect SVT electronics	1 day	6/1/05 13:00	6/2/05 12:00	Tanest et al

12	Survey "as found" location of SVT wrt magnet	1 hr	6/2/05 13:00	6/2/05 14:00	Dave,Doug
13	Install solenoid in bore	1 hr	6/2/05 14:00	6/2/05 15:00	Dave,Doug,Calvin
14	Install BoNus detector and BoNus target	2 hrs	5/31/05 14:30	5/31/05 16:30	Tom,Jill,Denny,BoNus Techs,Steve
15	Install BoNus target gas system	4 hrs	5/31/05 16:30	6/1/05 11:30	George,Steve,Krister,Denny
16	Install BoNus detector gas system	4 hrs	5/31/05 16:30	6/1/05 11:30	Steve,George,Denny,BoNuS
17	Connect BoNus electronics	2 hrs	6/1/05 11:30	6/1/05 14:30	Fenker,BoNuS
18	Pre Align BoNus detector and target	6 hrs	6/2/05 8:00	6/2/05 15:00	Survey/Alignment
19	Install BoNus into solenoid	1 hr	6/2/05 15:00	6/2/05 16:00	Dave,Doug,Calvin
20	Install BPM/upstream beam line and pump down	3 hrs	6/2/05 16:00	6/3/05 10:00	Tom,Jill,Denny
21	Final Align BoNus, Solenoid and Upstream beam pipes	4 hrs	6/3/05 10:00	6/3/05 15:00	Survey/Alignment

Runplan

1. Ask for 2.751 GeV beam, fill target with H_2. Outbending torus configuration. Trigger: standard CLAS trigger (1-6 "good electron", 1 prescaled minimum bias, 1 random). Establish beam conditions (see "Goals" 2). Take some ultra-low luminosity runs with very long ($100\mu s$) RTPC readout time to get unbiased hit/track rate (first with empty target -> look at pedestals, noise; then with full one). Study signal height distribution, RTPC occupancy etc. (see "Goals" 3-4). Repeat with normal luminosity. Finally look for ep and eπ coincidences. (Basically straight tracks that should allow us to determine our resolution of vertex and theta and phi for the protons; pions can be as low as 90 MeV/c backwards relative to q; once we measure their angle, we know their momentum!).
2. Pump out target, do empty target run, refill with D_2. Look for true spectator protons etc.
3. IF time (and other halls/MCC and background) permits: Go to 0.951 GeV beam energy, outbending configuration, H_2 target. Get minimum Q^2 elastic e⁻ tracks(for 12.5 degrees electron scattering angle: $Q^2 = 0.042$, q = 0.206 GeV, theta_q = 77.6 degrees.) Goal: Use these very well defined events to study vertex resolution, p and dE calibration/resolution.

Timeline

Date	Work
Fri 5/27 8 am	DVCS shuts down; Warm Cryo Target, Bleed up and clear BPMs/upstream beam line
Sat – Mon 5/30	Memorial Day weekend; work on detector in EEL
Tue 5/31 – Fri 6/3	Installation in the Hall
Sat 6/4 – Fri 6/10	BoNuS/SVT tests